[Document Y.]

BY THE HOUSE OF DELEGATES,
February 21, 1844.

Read and ordered to be printed.

ANSWER

OF THE

Chief Engineer of the Balt. and Ohio Rail Road Company,

RELATIVE TO THE CONSTRUCTION OF

A LOCK AND DAM NAVIGATION

FROM

DAM No. 6 TO THE SOUTH BRANCH, AND THENCE TO CUMBERLAND.

In obedience to an Order of the House of the 19th February.

COMMUNICATION.

ANNAPOLIS, Feb. 22, 1844.

To the Honorable
The Speaker of the House of Delegates :

SIR: In obedience to the order of the House of Delegates, passed upon the 20th instant, and calling upon him "to state in writing, to this House, how, and in what way, the construction of a Lock and Dam navigation, from Dam No. 6, to the South Branch, and from thence to Cumberland, will effect the Baltimore and Ohio Rail Road, or its property," the undersigned has the honor respectfully to submit the following

REPLY:

In the location of the Baltimore and Ohio Rail Road, between Dam No. 6, and Cumberland, the object of the company being to save expense in graduation as far as was consistent with the safety and other requisites of the work, the bottom lands of the river, were generally chosen for the scite of the road, as they offered the best and cheapest ground for that purpose. In order, however, to shorten the line by cutting off bends in the river, about one half of the route between the routes referred to, was laid upon the slopes and above the level of the flats. The whole distance from Dam No. 6, to Cumberland by the railway, is 46 miles, of which, 23 miles have thus been placed upon levels higher than those of the bottoms. For the remaining 23 miles, the road is located directly upon them at a height above extreme low water, varying from 22 to 26 feet, and averaging about 24 feet.

In this location, the canal company was consulted in regard to the levels of the Rail Road upon the bottom lands, which were established with its full knowledge and consent, and at its instance, changes were made in the elevation of the road at several points for its accommodation, as will more fully appear from the annexed statement marked (A.)

The freshets of the Potomac are variable in the extreme height to which they attain at different points along the river. At Cumberland they reach about 13 feet above low water. At Patterson's creek, (8 miles below) 20 feet. At the South Branch, (16 miles below) 26 feet. At the Little Cacapon, (22 miles below) 25 feet. At the Great Cacapon, (46½ miles lower) 24 feet, and about the same average height thence to Harpers Ferry; the above distances being all counted upon the Rail Road.

Upon the parts of the Rail Road located as above stated on the bottom lands, the level of the bed of the road was designed to be placed in general, *at the place of extreme high water*, and the great flood of April 1843, in fact reached the road at several points within the sections composing the 23 miles above mentioned; but did not submerge the rails. No serious damage was done to the Rail Road on that occasion; but no doubt is entertained by the undersigned that an additional rise of *not exceeding* three feet would have produced considerable injury to the work, and have endangered the wooden bridges across several of the principal tributaries of the river. These facts being premised, it will follow that upon the 23 miles upon the flats, the Rail Road would be subjected to the risk of serious damage by any change in the bed of the river, which would cause the height of extreme freshets to increase; as the road, at present barely out of the reach of injury from them, would, in that case, become covered with water on such occasions, to an extent which would produce consequences disastrous in proportion to the depth of the overflow. As a Lock and Dam navigation upon these 23 miles would virtually raise the level of the bed of the river with reference to that of the Rail road, the inevitable consequence would be what has just been stated. Should a depth of water be provided at the *head* of each pool equal to that of the finished canal below Dam No. 6, the surface of low water in the river, from which the rise in freshets is calculated, would then be raised 4½ feet at those points (allowing the present depth of water to be 1½ feet) and this elevation would increase with the fall of the river towards the foot of the pool, at the next dam below, where it would attain its greatest height. The height of the dams would depend upon their distances from each other; the height and distance increasing together. The fall of the river from Cumberland to Dam No. 6, averages about 3 feet per mile, so that for every mile of distance between the dams 3 feet would be added to the elevation of the water above its present height, at the heads of the pools. If that be taken at 4½ feet, and the dams should be placed only one mile apart, the low water surface of the river would be raised 7½ feet at the foot of the pool, and 4½ feet at its head; or, at a point midway, 6 feet, which elevation would cause the Railway to be inundated to a proportion of that depth, dependant upon the width and form of the valley, at every extreme freshet. This proportion would never probably be less than one half of the elevation of the bed of the river to be caused by the dam, as the width of the bottom lands, (which by permitting the water to spread would prevent its rising as high as if confined) rarely exceed that of the river between its banks.

If the dams were placed 2 miles apart, the average elevation of low water would be 7½ feet—if 3 miles apart, it would be 9 feet—

if 4 miles, 10½ feet, and so on, adding 1½ feet for every additional mile of distance between the dams. It is not likely that they would be placed less than 4 miles asunder, which would make them about 16 or 17 feet high, and 15 in number between Dam No. 6 and Cumberland, so that the average elevation of low water above its present height would be 10½ feet, by which the railroad upon the 23 miles of low level, would be overflowed to a depth of probably not less than 6 feet at every high freshet. These estimates are presented only as an average of and approximation to the results which would ensue upon the construction of the dams in question; but the undersigned is satisfied that they do not present an exaggerated view of the extent to which the railroad would be likely to be inundated on the occasions referred to. On the contrary, there are points upon the river, where the narrowness of the valley would increase the overflow considerably beyond the mean depths here estimated, which depths would also be much augmented by the breaking of any of the dams, and the consequent rise of the water let loose by it upon the level below. Such floods as would produce the effects described are not, indeed, of annual or ordinary occurrence. Within the present century, however, at least four such have happened, being about one in every 8 or 10 years. If however they should occur but once in 20 or 30 years, the damage which they would probably inflict would be almost incalculable, not so much in the mere cost of repairs involved, (large as that would be,) as in the suspension of the business of the road to which they would give rise.

From the risk of these injuries it would not be practicable to protect either the railroad or the proprietors of the bottom lands upon which it is located, by the erection of *guard banks*, as these banks would have to be left open at all their frequent points of intersection with the line of the road; and they would thus only increase the mischief done by the water, by confining it and giving it an increased current at those places.

To remunerate adequately the company from the losses it might sustain by high water, would be equally impracticable; but if the pecuniary amount of those losses could be ascertained fairly, it would, together with that of the injuries done to the land owners, probably reach a sum so large, as to increase the expense of the proposed lock and dam improvement, to an extent so much beyond the simple cost of constructing the work, as to make it in the end more expensive than a description of navigation, which would be more perfect in itself, while it would be free from danger to property.

The preceding statements will, it is believed, furnish an answer to the enquiries of the House, which have been addressed to the undersigned. He is under the strongest convictions:

1st. That the lock and dam improvement referred to by those enquiries, if continuous between Dam No. 6 and Cumberland, or a point 6 miles below it, would place 23 miles, or one-half of the length of that part of the railroad in imminent jeopardy at the occurrence of every high freshet.

2nd. That against these casualties it would be impracticable to provide a preventive remedy by guard banks or other defensive works.

3d. That the damages which would be caused to the railroad and to private property by the erection of the proposed dams, if they could be adequately compensated for in money, would eventually make the slack water navigation referred to, as expensive probably as any other mode of effecting the object which that improvement would have in view.

All of which is most respectfully submitted,

BENJAMIN H. LATROBE,
Chief Engineer Balt. & Ohio Railroad Co.

PAPER A

Referred to in the answer of Benj. H. Latrobe, Chief Engineer of the Baltimore and Ohio Raid Road, to the order of the House of Delegates, of February 20th, 1844.

The following is a statement of the manner in which the levels of the Baltimore and Ohio Rail Road, in the valley of the Potomac between Harpers Ferry and Cumberland, were established.

For the purpose of fixing to the satisfaction of the Chesapeake and Ohio Canal company, the location of such parts of the Rail Road as might come into contact with the canal at the narrow passes of the river above Harpers Ferry, Jonathan Knight, then Chief Engineer of the Rail Road, and Charles B. Fisk, Chief Engineer of the Canal, in December 1838, agreed upon the position of the Rail Road at the points of difficulty which occurred within the 6 miles of the Rail Road in Maryland, next below Cumberland, the Canal having been previously located at those places.

The same two officers at the same time agreed upon the levels of the Rail Road at the South Branch and the Great Cacapon, in Virginia, which were adjusted at those points according to the wish of the Canal Company, to permit the future passage, under the Rail Road, of navigable feeders to the Canal from those streams.

The agreements referring to the preceding points, are on file in the offices of the two companies.

Subsequently, in 1839, during the location of the Rail Road in the neighborhood of the Canal tunnel, the Chief Engineer of the Canal, C. B. Fisk, notified the undersigned, that the levels of the Rail Road, at a point on the Pawpaw bend opposite the "tumbling dam falls," should be raised so as to place the Rail Road out of the reach of high water, when a dam contemplated by the Canal Company should be erected at that point, and the Rail Road levels were raised accordingly.

In regard to the location of the rest of the Rail Road in the immediate valley of the Potomac river, between Harpers Ferry and Cumberland, the undersigned freely interchanged ideas with C. B. Fisk, Chief Engineer of the canal, respecting the levels proper to be adopted by the Rail Road; and the undersigned in his determination of those levels was governed by the previously acquired experience of that officer and by his advice in regard to the freshets of the river.

The Rail Road was thus located throughout the immediate valley of the Potomac, by the concurrent act of the two companies wherever there was a danger of collision between their respective works, and where there was none, the Canal Company assented to and approved of the location of the Rail Road as made by the Rail Road company.

The undersigned further states that the levels of the Rail Road were, (the Canal company concurring) establised altogether with reference to a continuous canal from Dam No. 6, to Cumberland, and not to a lock and dam navigation, which last, had it been in contemplation would have made a very different series of levels necessary to the safety of the Rail Road, and if now carried into effect, would cause the inundation of that work in high freshets at many places between the points just mentioned.

In conclusion, the undersigned refers to the reports relating, in part, to this subject, made by the President and Chief Engineer of the Canal company, in answer to the order of the House of Delegates of February 20th, 1844, (Document T.) as corroborating the preceding statements.

BENJ. H. LATROBE,
Chief Engineer, B. & O. R. R.

Annapolis, February 22, 1844.